

Hospital payment systems based on diagnosis-related groups: experiences in low- and middle-income countries

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Objective This paper provides a comprehensive overview of hospital payment systems based on diagnosis-related groups (DRGs) in low- and middle-income countries. It also explores design and implementation issues and the related challenges countries face.

Methods A literature research for papers on DRG-based payment systems in low- and middle-income countries was conducted in English, French and Spanish through Pubmed, the Pan American Health Organization's Regional Library of Medicine and Google.

Findings Twelve low- and middle-income countries have DRG-based payment systems and another 17 are in the piloting or exploratory stage. Countries have chosen from a wide range of imported and self-developed DRG models and most have adapted such models to their specific contexts. All countries have set expenditure ceilings. In general, systems were piloted before being implemented. The need to meet certain requirements in terms of coding standardization, data availability and information technology made implementation difficult. Private sector providers have not been fully integrated, but most countries have managed to delink hospital financing from public finance budgeting.

Conclusion Although more evidence on the impact of DRG-based payment systems is needed, our findings suggest that (i) the greater portion of health-care financing should be public rather than private; (ii) it is advisable to pilot systems first and to establish expenditure ceilings; (iii) countries that import an existing variant of a DRG-based system should be mindful of the need for adaptation; and (iv) countries should promote the cooperation of providers for appropriate data generation and claims management.

Abstracts in **عربي**, **中文**, **Français**, **Русский** and **Español** at the end of each article.

Introduction

A key factor for a more rapid move towards universal health coverage is the efficient use of resources, coupled with increased resource mobilization and improved pooling. Substantial efficiency gains could be made by reforming hospital payment mechanisms,¹ especially since expenditure on hospital services comprises one of the largest shares of total health-care spending in all countries, regardless of their income level.^{1,2}

Payment systems based on diagnosis-related groups (DRGs) are one type of such hospital payment mechanisms, along with capitation payments, global budgets and a combination thereof. Although DRG-based payment systems are now mainly understood as a reimbursement mechanism, their original purpose was to enable performance comparisons across hospitals.³⁻⁵ Today DRGs are used primarily by purchasers to reimburse providers for acute inpatient care, but in principle they can also be used to reimburse them for non-acute inpatient care. By definition, DRGs classify cases according to the following variables: principal and secondary diagnoses, patient age and sex, the presence of co-morbidities and complications and the procedures performed. Cases classified as belonging to a particular DRG are characterized by a homogenous resource consumption pattern and, at the same time, DRGs are clinically meaningful. Thus, cases within the same DRG are economically and medically similar.^{2,3} DRG-based payment systems are often referred to as “case-based” or “case-mix-based”, yet DRG-based and case-mix-based payment systems are not the same. Even though the two overlap and are separated in practice by fluid boundaries, a DRG-based system is different in that it is based on a DRG grouping algorithm.⁴ In fact, the two core design characteristics of a DRG-based payment system are: (i) an exhaustive patient case classification system (i.e. the system

of diagnosis-related groupings) and (ii) the payment formula, which is based on the base rate multiplied by a relative cost weight specific for each DRG.²

Since the 1990s, payments based on DRGs have gradually become the principal means of reimbursing hospitals for acute inpatient care in most high-income countries.⁵ The most frequent reasons for introducing DRG-based payments are to increase efficiency and contain costs.⁵ Street et al. have reviewed the little evidence that is available on the impact of different DRG-based payment systems in high-income countries in Europe.⁶ Their findings suggest that DRGs generally help to increase hospital efficiency by reducing the average length of stay but that they also increase case volumes.

Meanwhile, more and more low- and middle-income countries have begun to explore or have established DRG-based payment systems, mostly for the reimbursement of acute inpatient care. With the exception of country papers or manuals on how to introduce case-based payment and DRGs,^{5,7} there is no comprehensive overview of DRG practices in low- and middle-income countries. This paper addresses this gap in the literature by being the first to provide a comprehensive overview and assessment of DRG experiences in low- and middle-income countries. Its purpose is to compile country experiences and to explore the design and implementation issues that low- and middle-income countries face. Ultimately it will be a source of policy lessons for policy-makers in other low- and middle-income countries who are deliberating on whether or not – and, if so, how – to move towards a DRG-based payment system. Because the evidence is scanty and impact evaluations are few, this paper cannot review the impact of DRG-based payment systems. It can only provide illustrative examples of policy lever effects, primarily from countries that have already established a DRG-based payment system.

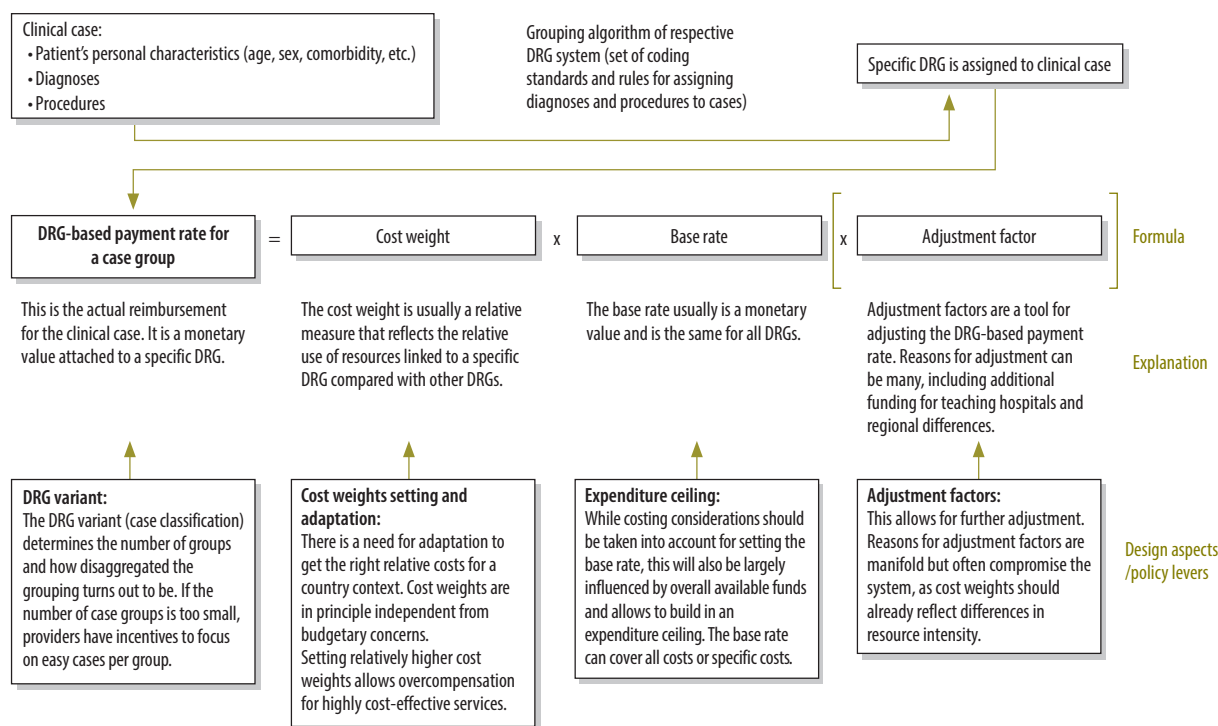
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Fig. 1. Core design components of diagnosis-related groups (DRGs)



The following section briefly outlines the methods and core design components that we followed in assessing countries' experiences with DRG-based payment systems. We subsequently present emerging aspects and trends in the design and implementation of these systems. These and the challenges they entail are considered in the discussion section, which is followed by a set of conclusions and policy lessons for other countries that are exploring the establishment of DRG-based payment systems.

Methods

Fig. 1 summarizes the core design components of DRGs, namely: (i) DRG variant; (ii) cost weights; (iii) expenditure ceilings and (iv) adjustment factors. The figure also outlines how values can be set for these components and their potential effect as policy levers. We will explore country experiences in terms of these design components and the respective policy levers (i.e. the possible effects of such design choices). Importantly, the qualitative and quantitative effect of a DRG-based payment system is also contingent upon the payment mechanism that is replaced.⁶

Several issues are involved in the operation of a DRG-based payment system.

Foremost, such a payment system creates unwanted incentives for increased hospital admissions, up-coding (i.e. the intentional and wrongful augmentation of case severity and thus reimbursement) and under-provision of necessary services.^{5,8} This occurs in all settings. Here, however, the focus is on implementation issues that are critical in a low- or middle-income country: (i) the piloting of such a system; (ii) problems with coding standardization, data availability and information technology requirements; (iii) integration of the private sector, and (iv) hospital autonomy.

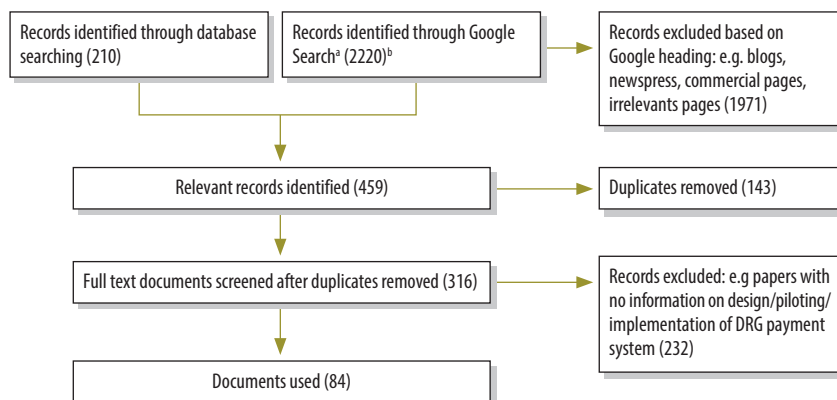
We conducted a search of the literature published from 1980 until December 2012. We started by searching for peer-reviewed English-, French- and Spanish-language publications indexed in Pubmed and in the Pan American Health Organization's Regional Library of Medicine (BIREME) on the subject of the design, piloting or implementation of DRG-based payment systems in low- and middle-income countries. Since we found very few sources that fulfilled our criteria, we also searched Google in the three languages to capture the grey literature (e.g. consultancy reports, government reports).

In a first step, to establish a list of countries with a DRG-based payment

system, we combined the following search terms: *diagnosis-related group* [MeSH Terms] AND *low-income country* OR *middle-income country* OR *low-income countries* OR *middle-income countries*. In Google, the search terms also included *provider payment mechanism* OR *case-mix* OR *DRG* OR *health system financing* OR *case-mix financing* OR *case-based funding*. We also consulted health financing experts from the different regions of the World Health Organization to confirm the country list. Once we had an established list of countries, we performed a second literature search in PubMed, BIREME and Google that focused on each country. The name of each country was combined with the following search terms or phrases: *DRG*, *diagnosis-related groups*, *case-mix*, *provider payment mechanism*, *health system financing* and *case-based funding*. In this way we not only established a list of countries applying or developing a DRG-based payment system, but also – and more importantly – retrieved more information on those critical aspects of system design and implementation that we described earlier. The study selection process is outlined in Fig. 2. We used 84 documents for this country-based analysis.

This overview focuses on low- and middle-income countries that have already established – or are in the process

Fig. 2. **Flowchart showing study selection process for systematic review of studies on payment systems based on diagnosis-related groups (DRGs) in low- and middle-income countries**



^a In Google, the first six pages, with 10 results per page, were considered.

^b For 29 countries; also in Spanish for six Latin American countries and in French for Tunisia.

of developing – DRG-based payment systems. Because it also seeks to explore critical aspects of design and implementation, it also includes all those countries with established DRG-based payment systems that were in the World Bank's middle-income country category when they adopted such systems but that have moved into the high-income category within the past 10 years.⁹ In this way we have tried to capture the experience of low- and middle-income countries over a full decade of development of DRG-based payment systems.

Findings

Design patterns

DRG development stage

Countries operating DRG-based payment systems vary widely in terms of gross domestic product and total health expenditure per capita, as shown in Table 1 (available at: <http://www.who.int/bulletin/volumes/91/10/12-115931>), which summarizes relevant health expenditure indicators. Twelve low- and middle-income countries located in all regions had established a DRG-based payment system by the end of 2012. Another 17 countries are currently piloting or exploring design options for the establishment of such a system. Of the 12 countries with an established system, only Kyrgyzstan is a low-income country; most are located in eastern Europe, and nine were under Soviet influence.

Table 2 summarizes the main features of DRG system design for countries that already have nationwide DRG-based

payment systems. The second group of countries – those piloting systems or exploring design options – is composed of middle-income countries, only two of which are classified as being in the lower-middle-income bracket. They, too, are situated in all regions. This group of countries may not be comprehensive, however, since other countries may also be exploring the development of a DRG-based payment system but policy documentation to this effect might not be publicly available. Table 3 provides an overview of the countries that are piloting a DRG-based payment system or exploring the establishment of such a system, and it presents some features of system design. One country – Kazakhstan – introduced a DRG-based payment system but abandoned it in 2010.⁸⁰ Several other countries, such as Ghana and the Philippines, have introduced case-mix-based payments and may want to move towards DRG-based payment systems at a later stage. In fact, Ghana calls its groupings the “G-DRGs” (with the initial G standing for Ghana).⁸¹ More detailed country overviews can be found in Mathauer & Wittenbecher.⁸²

Rationale for DRG introduction

As is the case in many high-income countries, DRG-based payment systems were usually introduced in the countries described in this paper to contain costs, to increase efficiency in inpatient care or to improve transparency in hospital activities. Of these, increasing efficiency is the reason most closely linked to DRG-based payment systems and the rationale behind the introduction of such systems

in former Soviet republics still grappling with a legacy of overcapacity in inpatient care, such as Estonia¹⁴ and Kyrgyzstan.^{26,83} China,⁸⁴ Hungary¹⁹, The former Yugoslav Republic of Macedonia,⁸⁵ Romania³⁹ and Serbia⁷¹ also expect DRG-based payment systems to increase efficiency. Making hospital activity more transparent for purchasers and providers was an explicit objective in Poland³⁷ and Serbia.⁷¹ In China⁸⁴ and The former Yugoslav Republic of Macedonia,⁸⁶ the introduction of DRG-based payment systems is also expected to improve service quality. In Croatia, DRG-based payment is used to increase the number of cases seen and reduce waiting lists.¹³ As discussed in the following section, these specific objectives are, in principle, decisive when it comes to choosing a particular design for a DRG-based payment system.

DRG variants chosen

Most low- and middle-income countries use DRG-based payments as a retrospective payment mechanism; only The former Yugoslav Republic of Macedonia uses DRGs as a basis for prospective budgeting decisions. The DRG variant chosen by a country determines the number of case groups as well as the cost weights or range of cost weights used, yet country-specific adjustments, to be discussed in a subsequent section, may be required. As shown in Table 2, the DRG variants chosen by the countries cover the full range of existing DRG variants. Moreover, some countries switched from one variant to another or developed their DRG-based systems over time by making adjustments, such as generating more detailed and specific case groupings. This dynamic developmental process of introducing and implementing DRGs appears to reflect improvements in administrative and operational capacity, i.e. in the capacity of countries to run an increasingly sophisticated DRG-based payment system.

Most of the low- and middle-income countries in this study use a DRG-based hospital payment system consisting of about 500 to 800 case groups. Kyrgyzstan and Mongolia are exceptional in having a much lower number of case groups. In Kyrgyzstan case groups are broader and the classification system is less demanding, since the DRG-based payment system serves to provide hospitals with funding in addition to budget allocations.⁵ In Mongolia, the health ministry directly finances many inpatient services,³³ which results in fewer remaining DRGs. On the

Table 2. Context and features of institutional design aspects in countries with nationwide DRG-based payment systems

Country	Purchaser(s) paying via DRG	Year when DRG-based payment piloted/introduced	DRG variant (and changes)	No. of case groups (and development) ^a	Expenditure/volume ceilings	Type of DRG piloting
Croatia ^b	National social health insurance scheme ¹⁰	2007: piloting ¹¹ 2009: national implementation as payment method ¹³	AR-DRGs ^{10,11}	671 ¹²	Provider-specific hard budget cap ¹¹	Shadow billing ¹¹
Estonia ^b	National social health insurance scheme ^{14,15}	2003: piloting 2004: national implementation as payment method ¹⁵	NordDRG ¹⁵	2003: 498 2010: 655 ¹⁶	Provider-specific soft budget cap based on cost and volume (up to 30% overruns reimbursed) Health insurance funds as a whole are capped, if funds are exhausted there are no additional transfers from the state budget ¹⁴	Shadow billing; incremental increase of share of hospital payment via DRGs (70% since 2009) ¹⁶
Hungary ^b	National social health insurance scheme ¹⁷	1987: piloting; 1993: national implementation as payment method ^{19,21}	Self-developed, based on/influenced by HCFA-DRGs ¹⁸	1993: 437 ¹⁹ mid-/end-1990s: 758 ¹⁹ 2010: 780 ¹⁸	Service-type-specific hard budget cap based on volume; budget transfers between providers possible; in the past, volume contracts implied annually decreasing volumes ¹⁸	In selected hospitals ²⁰
Indonesia	<i>Jamkesmas</i> -Program for the poor: tax-financed health insurance scheme ²²	2009: piloting; 2010: national implementation as payment method ²²	HCFA-DRG-based ²³ ; shift to INA-DRGbased on UNU-grouper envisaged ²⁴	1077 DRGs ²³	NA	In selected hospitals ²²
Kyrgyzstan	National social health insurance scheme ²⁵	1997: piloting; ²⁶ 2001: national implementation as payment method; ⁵ 2003: major revision and refinement, introduction of ICD-10 coding ⁵	Self-developed, based on/influenced by HCFA-DRGs ²⁶	1997: 28 (56) ²⁶ 1999: 140 ⁵ 2005: 150 ⁵	Provider-specific budget cap based on cost and volume with sanctions for overruns ²⁵	Limited number of DRGs ²⁶ ; later in selected hospitals ⁵
Lithuania	National social health insurance scheme ²⁷	2011: piloting; ²⁸ 2012: national implementation as payment method ²⁷	AR-DRG ²⁸	NA	NA	NA
Mexico	National social health insurance scheme (for formal sector workers) ²⁹	NA (late 1990s) ²⁹	Self-developed and based on/influenced by HCFA-DRGs ^{30,31}	2011: 700 ³²	NA	NA
Mongolia	National social health insurance ³³	2006: piloting 2010: national implementation as payment method ³⁵	Self-developed ³⁴	2006: 22 2010: 115 ³⁵	Provider-specific budget cap ³³	Small number of DRGs ³⁵
Poland ^b	National social health insurance ³⁶	2008: piloting 2009: national implementation as payment method ³⁷	British HRGs ³⁷	2008: 518 ³⁷ 2012: 519 ³⁸	NA	Piloting in selected hospitals (6 months) then national pilot with DRGs for reporting only (6 months) ³⁷
Romania	National social health insurance ³⁹	1999: piloting 2004: national implementation as payment method ³⁹ 2005–2010: extension of the system to different hospital types (Ministry of Defence and private hospitals excluded) ⁴⁰	Until 2007: HCFA-DRG Since 2007: AR-DRG (ICD-10-based) ⁴⁰	Until 2007: 499 DRGs Since 2007: 665 DRGs ⁴⁰	Hard budget cap for hospital sector; additionally provider-specific hard budget cap based on volume; budget transfers between providers possible ⁴⁰	Piloting in selected hospitals, number of pilot hospitals incrementally increased from 1 to 23 between 1999 and 2002 ³⁹

(continues. . .)

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Country	Purchaser(s) paying via DRG	Year when DRG-based payment piloted/ introduced	DRG variant (and changes)	No. of case groups (and development) ^a	Expenditure/ volume ceilings	Type of DRG piloting
Thailand	i) UCS: tax-financed social health insurance ii) CSMBS: contribution-based social health insurance ^{42,43}	i) UCS: 2001: piloting 2002: national implementation as payment method 2003, 2007, 2010, 2011: refinements ii) CSMBS: 2007: national implementation as payment method ^{41,44}	HCFA-/AR DRG-based, later Thai versions	2011: 2 450 (ICD-10-based), plus 54 TMHCC and 41 sub-acute/non-acute patients ⁴¹	i) UCS: hard budget cap ii) CSMBS: no budget cap ⁴²	i) UCS: piloting in hospitals of 10 provinces and for 100 accident DRGs ⁴² ii) CSMBS: different base rate for each hospital ⁴¹
The former Yugoslav Republic of Macedonia	National social health insurance scheme ⁴⁵	2009: national implementation, basis for hospital budgets ⁴⁶ 2010: extension to psychiatric and private hospitals ⁴⁸	AR-DRG ⁴⁷	666 ⁴⁸	NA	Shadow billing ⁴⁵

AR-DRG, Australian refined DRG; CSMBS, Civil Servant Medical Benefit Scheme; DRG, diagnosis-related group; HCFA-DRG, Health Care Financing Administration DRG; HRG, Health Care Resource Group; ICD-10, International Classification of Diseases, tenth revision; INA-DRG, Indonesia DRG; NA, not available; TMHCC, Thai mental health case mix classification; UCS, Universal Coverage Scheme; UNU, United Nations University.

^a Croatia, Estonia, Hungary and Poland were middle-income countries when the DRG-based system was developed and introduced but moved to the high-income country group in 2008, 2006, 2007 and 2009, respectively.

^b Year given if known and/or if a change of number of groups has taken place.

^c Shadow billing: DRGs used for reporting and (mock) billing, though actual reimbursement is still according to the previous payment system.

other hand, Indonesia and Thailand have 1077 and 2700 case groups, respectively. A higher number of groups may reflect a more sophisticated health-care system that provides a greater variety of services. On the other hand, fewer groups could also signify that the groupings are deliberately broader, which increases the need for efficient use of resources on the provider side.

Finally, only Kyrgyzstan²⁶ was found to apply adjustment factors to calibrate its payment system for different provider levels and for different regions. In addition, the country trialled a higher base rate at the regional level for patients who were exempted from formal co-payments.²⁶

Ceilings

The base rate value is ultimately a reflection of the overall amount of funding available. Thus, establishing an explicit budget and setting volume ceilings are equally important in guiding hospital management. All countries for which information is available do indeed have a ceiling in place. The purpose of volume or budget ceilings as a policy lever is to contain costs, but their effects can vary. In Hungary, for example, the negotiated volume levels decreased over the years and, as a result, waiting periods increased.¹⁸ In Mongolia, hospital volume ceilings have created an incentive to exhaust the maximum volume set.³³ This might easily lead to unnecessary admissions. Flexible

case volume allocations across hospitals depending on utilization rates within a global ceiling, such as in Romania,³⁹ are another possibility. Yet, the incentive for a hospital to increase its case volume remains. In Thailand, on the other hand, the base rate varies in accordance with the overall number of cases to stay within the total budget.⁸⁷

Adaptation

The final step upon choosing a DRG-variant is the process of adapting it to a specific country context. This applies primarily to cost weights but also to case grouping in the case of an imported system. Adaptation is needed because the cost structure of delivering acute care may vary considerably across countries, depending on their level of technology and the degree of labour applied. If cost weights are inadequately adjusted, it may create the wrong incentives. Most countries have in fact undertaken some adjustment of cost weights to their country context. For example, Kyrgyzstan²⁶ and Poland³⁷ used the costing data that were available before the introduction of the DRG-based system for their case weight adjustment. In Croatia, costing studies were conducted for this purpose,¹¹ whereas The former Yugoslav Republic of Macedonia took the cost weights from Croatia⁴⁷ and adjusted them to its own context. In contrast, in Romania cost weights were not adjusted in accordance

with the clinical reality and this created the incentive to up-code in various medical specialties.⁴⁰

Implementation issues

Piloting

To pilot a DRG-based payment system, a country can begin with any of the following paths or a combination thereof: (i) a limited number of hospitals; (ii) a subset of hospital cases paid by DRGs; (iii) a subset of costs; (iv) shadow billing (i.e. DRG claims are sent in and a mock bill is provided to inform the hospital of its potential remuneration amount); or (v) a hospital-specific base rate is gradually converted to a nationwide rate. We found that, like most high-income countries belonging to the Organisation for Economic Co-operation and Development, all countries piloted DRGs before implementing a DRG-based payment system nationwide (Table 2).⁸ The piloting and extension period usually spread over several years. Most countries chose a combination of piloting paths, but the most frequent one was the first option mentioned here – a limited number of hospitals. The last option – a hospital-specific base rate that was gradually converted to a nationwide rate – was not followed by any country. In some of the countries in the exploratory stage, DRGs have been used so far for case classification only, but not for payment, particularly in Latin America (Table 3).

Table 3. Countries piloting or exploring a hospital payment system based on diagnosis-related groups (DRGs)

Country	Design and implementation
Argentina ⁴⁹	DRGs used by some hospitals for reporting and analysis
Bulgaria ^{50,51}	Introduction of a DRG-based payment system under discussion
Chile ^{52,53}	Research trials started in early 2000s for reporting in selected hospitals based on AP-DRGs; more recent trials under ministerial guidance favour IR-DRGs
China ^{54,55}	AR-DRGs trialled in selected hospitals for recording and in others for shadow billing; ^a also case classification development
Colombia ^{56–59}	DRGs used by some hospitals for reporting and monitoring since mid-2000s
Costa Rica ⁶⁰	DRGs used for reporting nationally since 1998; 999 DRGs based on HCFA-DRG updated with ICD 10
Islamic Republic of Iran ^{61–64}	Research trials mapping inpatient cases of selected hospitals with AR-DRGs
Latvia ⁶⁵	Introduction of a DRG-based payment system based on NordDRGs envisaged for 2014 ^b
Malaysia ^{66,67}	DRG-based payment system based on UNU-grouper is under discussion; trials already conducted in selected hospitals
Montenegro ⁶⁸	Introduction of a DRG-based payment system under discussion
Republic of Moldova ^{69,70}	Introduction of a DRG-based payment system under discussion; unlimited AR-DRG license purchased 2012
Serbia ⁷¹	Introduction of a DRG-based payment system based on AR-DRGs planned; ongoing trials in selected hospitals
South Africa ⁷²	DRGs used by some hospitals and managed care companies for own analysis; introduction of a DRG-based payment system under discussion
Tunisia ⁷³	Implementation of a DRG-based payment system based on GHM (the French DRG variant) in selected hospitals for a limited set of diagnoses in 2007
Turkey ^{74,75}	Introduction of a DRG-based payment system based on AR-DRGs decided upon after a research and trial period (2005–2009); currently hospitals receive global budgets and 10% of hospital budgets are allocated according to DRG-derived case mix since 2011; incremental increase planned ^c
Uruguay ^{76,77}	Research trial of IR-DRGs in one hospital; further research on feasibility of a DRG-system based on UNU-grouper
Viet Nam ^{78,79}	Research trial of 4 DRGs in selected hospitals; ongoing data collection for development of a UNU-grouper based DRG-system

AP-DRG, all patients DRG; AR-DRG, Australian refined DRG; GHM, *Groupes Homogènes des Malades*; HCFA-DRG, Health Care Financing Administration DRG; ICD-10, *International Classification of Diseases and Related Health Problems 10th Revision*; IR-DRG, international refined DRG; UNU, United Nations University.

^a Shadow billing: DRGs used for reporting and (mock) billing, though actual reimbursement is still according to the previous payment system.

^b U Mitenberg & E Mikits, personal communication.

^c U Basara, personal communication.

Capacity needed to start the DRG system

If specific information technology requirements and a data generation system for case payments are already in place before a DRG-based system is introduced, as was the case in The former Yugoslav Republic of Macedonia, the shift to DRGs will be much easier.⁴⁷ However, during the introduction and piloting phases especially, generating clinical and costing data and linking them via an appropriate information technology system can prove difficult. This difficulty is inherent in that the availability of data on diagnosis is a

prerequisite for DRG-based payments, but the systems needed to generate the necessary data are not usually set up until a DRG-based system is already in place. For example, in an Estonian Health Insurance Fund publication it was noted that providers were only motivated to apply the coding scheme once DRGs were in place as a payment system.¹⁵ An interesting way of enhancing provider cooperation was used in Kyrgyzstan, where the introduction of DRGs was accompanied by performance-based staff bonuses that improved providers' acceptance of the system.²⁶

In other countries, a lack of standardized and systematized data generation and coding has been slowing down the introduction of DRGs. In the Viet Nam pilot, for example, the relevant input data were recorded at the hospital level but scattered among different work stations within the hospitals and were thus not fully ready to be used in a DRG-based payment system.⁷⁸ When new coding methods and data generation tools are introduced, extensive training of medical staff becomes necessary, as specifically reported in Estonia¹⁵, the Islamic Republic of Iran,⁶¹ Serbia⁷¹ and Viet Nam.⁷⁸ In Thailand, for instance, it was recommended to train coders after reports that a high proportion of DRGs were being wrongly assigned.⁴³ This example underscores the need for auditing of DRG-based payment systems to detect errors in coding practices. Incorrect coding practices can be overcome with training, but fraudulent coding practices also occur and call for regular coding practice audits. Thus, piloting should also be viewed as a way to eventually develop the necessary capacity.

Integration of private sector providers

In many countries, DRG-based payments apply to both public and private sector providers. In fact, the shift from budget allocations to DRG-based payment systems makes the inclusion of the private sector in the provision of services – i.e. publicly financed services – more appealing. Yet, when a purchaser offers different reimbursement for private sector services, the implications are many. For one thing, the expected efficiency gains of a DRG-based payment system are then limited to the public sector. In addition, there is no fair competition between public and private providers. For example, in Romania,⁴⁰ DRG-based payments apply only to public providers, whereas private providers are paid on a negotiated fee for services.

When calculating DRG tariffs for private providers, the fact that these do not receive supply-side financing from the government should be borne in mind. In Mongolia, however, the DRG base rate for private providers was only 50% the rate applied to the public sector, with balance billing permitted at the providers' own discretion.³³ Regulating – and prohibiting – balance billing is thus important for protecting patients from excessive user charges but may create in-

centives for providers to charge informal payments if DRG rates are below costs.

Hospital autonomy

To respond to incentives to improve efficiency – i.e. streamline the use of resources and shift resources to their most effective use – hospitals need a certain degree of autonomy in management and spending. Essentially, it is important to delink hospital financing from public finance administration, and most countries have done so. For example, in Poland the legal status of all hospitals was changed to that of independent institutions in the course of health system reforms.³⁷ Similarly, in Estonia all hospitals have been operating independently under private law since 2001.¹⁶ In contrast, Mongolian hospitals continue to run and report with a line-itemized budget logic and have limited autonomy,³³ and Kyrgyzstan is reportedly struggling in its efforts to delink hospital financing from public finance.⁸⁸

Discussion

Countries can choose between pre-existing DRG system variants (“importing” such systems) and developing their own. Adapting an imported DRG variant might imply sacrificing coherence in design, whereas self-developed systems can start out as a simpler alternative. However, these two options are divided by a very fine line and are really the extremes of a continuous scale, since major adaptations are required when an existing DRG variant is imported. In general, however, a country will probably need to invest more resources if it chooses to develop its own system. For example, Estonia¹⁵ and Lithuania,²⁸ two small countries, decided not to develop their own DRG classification systems because it was considered too resource-intensive. On the other hand, larger countries, such as Indonesia²⁴ and Thailand,⁴¹ implemented self-developed DRG-based systems for the most part and China^{54,55} also seems to be leaning towards a self-developed system.

The choice of a specific DRG variant depends on many factors. They have to do with the specific country context, the influence of external funding agencies, the degree of regional cooperation and exchange with neighbouring countries, and the time when the system is introduced. For example, the Scandinavian NordDRGs are found in Estonia and Latvia, whereas AR-DRGs (AR for “Australian Refined”) were introduced in Slovenia⁸⁹ and later

applied or explored in other countries of south-eastern Europe, such as The former Yugoslav Republic of Macedonia⁴⁷ and Romania.⁴⁰ Countries that began developing DRGs in the early 1990s, such as Kyrgyzstan and Hungary, were probably influenced by the American HCFA-DRG system because this was the one most readily accessible at the time.

There seems to be an important role for governments. In every country, once the types of hospitals to which the DRG-based payment system would apply had been decided, the use of DRGs for remuneration was made mandatory. Similarly, all DRG-based payment systems, whether established or under pilot testing, are operated by public health insurance schemes, with Latin America being somewhat unique in that the hospitals contributed to fostering DRG development. Moreover, government health expenditure plays a crucial role as well. At the time when DRG-based systems were implemented, government health expenditure was about two thirds of total health expenditure in all countries except Indonesia, Kyrgyzstan and Mexico. In contrast, in countries piloting or exploring the possibility of establishing DRG-based systems of payment, government expenditure on health is usually less than 66% of total health expenditure; it is more than this share in only 6 of the 17 countries. This suggests that an established health financing system based on pooling and prepayment is necessary for the launching of such payment reforms.

Many of the schemes seem to be constrained by tight funding. DRG-based tariffs and payments are often perceived or reported as being too low. This is the case in Kyrgyzstan,⁸⁸ The former Yugoslav Republic of Macedonia (Lazarevik personal communication, 2011), Mongolia³³ and Romania.⁴⁰ Tight funding – or underfunding – make it very difficult to implement DRGs because providers are less likely to cooperate. Thus, it is critically important to collect cost data to ensure adequate reimbursement, facilitate acceptance of a DRG-based payment system, and encourage provider cooperation.

Several countries, such as Hungary, Indonesia, Mongolia and Thailand, have multiple health insurance schemes, in addition to government budget allocations to providers. The existence of fragmented purchasing arrangements with different, often non-aligned, provider payment systems is not a problem specific to DRG-based hospital systems. However, it does also become a concern in the context of a

DRG-based payment system when there are conflicting incentives at the hospital level. For example, budget allocations may be based on the number of beds and staff members, whereas DRG-based systems incentivize fewer inputs per case. Or hospitals can find the remuneration schemes and rates of one purchaser more attractive financially than those of another. The Thai civil servant medical benefits scheme offers an example. In contrast to the Thai Universal Coverage Scheme, it receives higher DRG-based tariffs to which no budget ceiling applies.⁴² Similarly, the Indonesian insurance scheme for formal sector employees remunerates providers of inpatient care on a fee-for-service basis,²² a payment method frequently preferred by providers. Hence, the most important thing is for purchasing mechanisms to be aligned with each other. Finally, extensive pooling and a large financial or case volume for DRG-based payments may be preferable. Yet the example from Kyrgyzstan has shown that even if a small share of the costs is reimbursed via DRGs (but with a high case volume), substantial impact can result from the way the DRG payment system is designed.⁵

Although the challenges are many, initial signs of success are emerging. According to Health Insurance Fund sources, in The former Yugoslav Republic of Macedonia the DRG-based payment system has resulted in a decrease in the number of hospital beds and in the average length of inpatient stay and is widely accepted by providers.⁴⁸ In Kyrgyzstan, capacity for inpatient care was considerably reduced.⁵ The introduction of a DRG-based system in Croatia also reduced the average length of stay but had little impact on volume and no adverse effect on quality.¹² Moreno-Serra and Wagstaff³⁰ have assessed the shift from input-based budgeting to case-based payment methods in several countries of eastern and central Europe and central Asia. Although they assessed all case-based payment systems and not just those based on DRGs, overall they found a decrease in average length of stay and no increase in hospital admissions, but there was an increase in inpatient expenditure per case.

Study limitations

A major limitation of our study lies in the nature of much of the data used. Some were obtained from the non-peer-reviewed and grey literature or through a Google search. The Google search is not fully replicable because search results can

change very quickly. Hence, our study is more of an overview than a systematic review. Moreover, the language restrictions we imposed may have also resulted in the omission of country publications in other languages.

Conclusion

This overview shows that low- and middle-income countries in all parts of the world are using DRG-based payment systems to remunerate health-care providers. Overall, a DRG-based payment system is administratively and technically complex and its effective operation hinges on various institutional and organizational conditions.⁸ Nonetheless, the introduction of a DRG-based payment system should be seen as a dynamic developmental process during which these conditions can be met incrementally. Research stemming from specific countries is needed to further explore the potential effect of various

aspects of DRG-based systems design and policy levers.

Our findings suggest that, if a country decides to introduce a DRG-based payment system, health financing should come primarily from public rather than private sources.⁵ Piloting the system, particularly through selected hospitals and in combination with shadow billing and/or selected DRG groups, is advisable. If an existing DRG variant is imported, careful attention should be given to adjusting it to the local context. Eventually DRGs should be applied to as many different inpatient care providers as possible to avoid creating undesirable incentives. Finally, provider cooperation needs to be promoted to enhance appropriate data generation and claims management. Additionally, some form of expenditure or volume ceiling would help to incentivize the efficient use of resources.

Ultimately, the introduction of a DRG-based system is part of a long path

of continuous development and adjustment of provider payments. It might involve combining different provider payment mechanisms to arrive at the optimal mix of incentives, as has been done in many advanced health financing systems. ■

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ملخص

أنظمة الدفع في المستشفيات على أساس المجموعات المرتبطة بالتشخيص: الخبرات في البلدان منخفضة ومتوسطة الدخل
وقد وضعت كل البلدان أسقفاً للنفقات. وبشكل عام، تم تجربة الأنظمة قبل تنفيذها. وقد جعلت الحاجة إلى تلبية متطلبات معينة تتعلق بالتوحيد المعياري الترميزي وتوافر البيانات وتكنولوجيا المعلومات من التنفيذ عملية صعبة. ولم يتم إدماج مزودو الخدمة من القطاع الخاص بشكل كامل، ولكن معظم البلدان تمكنت من فصل تمويل المستشفيات عن موازنات التمويل العامة. الاستنتاج رغم الحاجة إلى مزيد من الأدلة عن تأثير أنظمة الدفع على أساس المجموعات المرتبطة بالتشخيص، فإن نتائجنا تشير إلى: (1) ينبغي أن يكون الجزء الأكبر من تمويل الرعاية الصحية عاماً وليس خاصاً؛ (2) ينصح بتجربة الأنظمة أولاً ووضع أسقف للنفقات؛ (3) ينبغي أن تتبها البلدان التي تستورد نوعاً قائماً من أنظمة الدفع على أساس المجموعات المرتبطة بالتشخيص إلى الحاجة إلى تكييفه؛ (4) ينبغي أن تشجع البلدان على التعاون بين المزودين لأغراض الإنشاء المناسب للبيانات وإدارة المطالبات.

الغرض يقدم هذا البحث نظرة عامة شاملة على أنظمة الدفع في المستشفيات على أساس المجموعات المرتبطة بالتشخيص في البلدان منخفضة ومتوسطة الدخل. كما يستكشف المسائل الخاصة بالتصميم والتنفيذ بالإضافة إلى التحديات التي تواجهها البلدان. الطريقة تم إجراء بحث في المؤلفات المنشورة الخاصة بدراسات أنظمة الدفع على أساس المجموعات المرتبطة بالتشخيص في البلدان منخفضة ومتوسطة الدخل باللغات الإنجليزية والفرنسية والإسبانية من خلال قاعدة البيانات Pubmed والمكتبة الإقليمية لمنظمة الصحة للبلدان الأمريكية ووغوغل. النتائج يوجد اثنا عشر بلداً من البلدان منخفضة ومتوسطة الدخل لديها أنظمة دفع على أساس المجموعات المرتبطة بالتشخيص وسبعة عشر بلداً أخرى في مرحلة التنفيذ التجريبي أو الاستكشاف. وتم اختيار البلدان من نطاق عريض من النماذج المستوردة والمطورة ذاتياً من أنظمة الدفع على أساس المجموعات المرتبطة بالتشخيص وقام معظمها بتكييف هذه النماذج وفق بيئاتها الخاصة.

摘要

基于诊断相关组的医院支付系统：中低收入国家的经验

目的 本文对中低收入国家基于诊断相关组 (DRG) 的医院支付系统进行综合概述。同时探讨设计和实施问题以及各国面临的相关挑战。

方法 通过 Pubmed、泛美卫生组织的区域性医学图书馆和谷歌对有关中低收入国家基于 DRG 支付系统的英语、法语和西班牙语论文进行文献研究。

结果 12 个中低收入国家拥有基于 DRG 的支付系统，其他 17 个国家还处于试点或探索阶段。各个国家从多种多样引进和自主开发的 DRG 模型中加以选择，大多数国家针对其特定国情进行了改进。所有国家都设置了封顶线。总体而言，系统在实施之前经过了试点。

因为要满足编码标准化、数据可用性和信息技术方面的特定需求，令实施面临困难。私营部门提供者尚未完全融入，但多数国家都一直在设法将医院财务与公共财政预算分离。

结论 尽管还需要更多证据证明 DRG 支付系统的影响，我们的研究结果表明：(i) 更大部分的医疗财务应公有而非私有；(ii) 首先对系统进行试点并设置封顶线是明智之举；(iii) 引进 DRG 系统现有形式的国家应记住需要因地制宜；(iv) 各国应促进提供者的合作，以实现适当的数据生成和报销管理。

Résumé

Systèmes de paiement des hôpitaux basés sur des groupes homogènes de diagnostic: expérience dans les pays à revenu faible et moyen

Objectif Cet article donne un aperçu complet des systèmes de paiement des hôpitaux basés sur les groupes homogènes de diagnostic (DRG) dans les pays à revenu faible et moyen. Il examine également les questions de conception et de mise en œuvre, ainsi que les défis associés auxquels les pays font face.

Méthodes Une recherche documentaire sur les articles portant sur les systèmes de paiement basés sur les groupes homogènes de diagnostic dans les pays à revenu faible et moyen a été menée en anglais, français et espagnol dans Pubmed, la Bibliothèque régionale de l'Organisation panaméricaine de la Santé et Google.

Résultats Douze pays à revenu faible et moyen ont des systèmes de paiement basés sur les groupes homogènes de diagnostic et dix-sept autres pays sont en phase pilote ou exploratoire. Les pays ont fait un choix dans une vaste gamme de modèles de groupes homogènes de diagnostic importés ou développés par eux-mêmes, et la plupart des pays ont adapté ces modèles à leurs contextes particuliers. Tous les pays ont défini un plafond de dépenses. En général, les systèmes ont été testés en phase pilote

avant d'être mis en œuvre. La nécessité de répondre à certaines exigences en termes de normalisation des codes, de disponibilité des données et de technologie des informations a rendu la mise en œuvre difficile. Les prestataires de service du secteur privé n'ont pas été pleinement intégrés mais la majorité des pays ont réussi à dissocier le financement des hôpitaux de la budgétisation des finances publiques.

Conclusion Bien qu'il soit nécessaire d'obtenir davantage de preuves sur l'impact des systèmes de paiement basés sur les groupes homogènes de diagnostic, nos résultats suggèrent que (i) la plus grande partie du financement des soins de santé devrait provenir du public plutôt que du privé; (ii) il est recommandé de tester d'abord les systèmes en phase pilote et d'établir des plafonds de dépenses; (iii) les pays qui importent un modèle existant d'un système basé sur les groupes homogènes de diagnostic devraient être conscients de la nécessité de les adapter à leurs spécificités; et (iv) les pays devraient promouvoir la coopération de prestataires de service pour la production appropriée des données et la gestion des réclamations.

Резюме

Системы платежей в больницах по клинко-статистическим группам: опыт стран с низким и средним уровнем доходов

Цель Данный документ содержит полный обзор систем платежей по клинко-статистическим группам (КСГ) в странах с низким и средним уровнем доходов. Кроме того, в нем исследуются вопросы структуры системы и ее внедрения, а также проблемы, с которыми сталкивались некоторые страны.

Методы Исследование литературы по системам платежей для различных клинко-статистических групп в странах с низким и средним уровнем дохода было проведено на английском, французском и испанском языках с помощью текстовой базы данных Pubmed, региональной библиотеки Панамериканской организации здравоохранения и поискового сервиса Google.

Результаты В двенадцати странах с низким и средним уровнем дохода системы платежей для клинко-статистических групп внедрены, а в еще семнадцати странах находятся на стадии пилотного проекта или исследования. Страны использовали различные заимствованные и самостоятельно разработанные модели КСГ, и многие из них приспособили такие модели к своим специфическим условиям. Во всех странах был установлен верхний предел расходов. Обычно

проводилось испытание системы перед ее внедрением, которое осложнялось необходимостью соответствия определенным требованиям в вопросах стандартизации кода, доступности данных и информационных технологий. Частные врачи не были полностью интегрированы, но большинству стран удалось отделить финансирование больниц от государственных финансов.

Вывод Несмотря на то, что необходимо собрать больше данных для определения влияния систем платежей по КСГ, по результатам нашего исследования можно сделать выводы, что (i) большая часть финансирования здравоохранения должна быть скорее государственной чем частной; (ii) рекомендуется провести испытание системы, чтобы определить верхний предел расходов; (iii) страны, заимствующие уже существующие варианты систем КСГ, должны принимать во внимание необходимость приспособления системы; и (iv) страны должны способствовать взаимодействию поставщиков медицинских услуг в вопросах получения соответствующих данных и рассмотрение претензий.

Resumen

Sistemas de pago hospitalario basados en grupos relacionados por el diagnóstico: experiencias en países de ingresos bajos y medianos

Objetivo Este documento ofrece una visión global de los sistemas de pago hospitalario basados en grupos relacionados por el diagnóstico (GRD) de países de ingresos bajos y medianos. Además, se analizan los problemas de diseño y ejecución, así como los desafíos relacionados a los que se enfrentan los países.

Métodos Se llevó a cabo una investigación bibliográfica en inglés, francés y español de trabajos sobre los sistemas de pago basados en GRD de países de ingresos bajos y medianos a través de Pubmed, la Biblioteca Regional de Medicina de la Organización Panamericana de la salud y Google.

Resultados Doce países de ingresos bajos y medianos tienen sistemas de pago basados en GRD y otros 17 se encuentran en fase experimental o exploratoria. Los países han realizado una selección de entre un amplio abanico de modelos de GRD importados y de desarrollo propio y la mayoría han adaptado estos modelos a sus contextos locales. Todos los países han establecido límites de gasto. En general, se pusieron a prueba los sistemas antes de su aplicación. La aplicación se ve dificultada

por la necesidad de cumplir con ciertos requisitos en términos de la normalización de la codificación, la disponibilidad, la información y la tecnología de la información. Los proveedores del sector privado no se han integrado plenamente, pero la mayoría de los países han logrado desvincular el financiamiento hospitalario del presupuesto de las finanzas públicas.

Conclusión Aunque se necesitan más pruebas sobre el impacto de los sistemas de pago basados en GRD, nuestros resultados sugieren que (i) la mayor parte del financiamiento sanitario debe ser público y no privado, (ii) se recomienda poner a prueba los sistemas previamente y establecer límites de gasto, (iii) los países que importan una variante actual de un sistema basado en GRD deberían tener en cuenta la necesidad de adaptación, y (iv) los países deben promover la cooperación de los proveedores a fin de que la generación de datos y la gestión de siniestros sean adecuadas.

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Table 1. Health expenditure indicators^a for 2010

Countries	Country income classification ^b	GDP per capita (US\$)	THE as percentage of GDP	GGHE as percentage of general government expenditure	Social security funds as percentage of GGHE	GGHE as percentage of THE	GGHE as percentage of THE in year when DRG-based payment system was introduced
With DRG system							
Croatia	HI (2008)	13 739	7.8	17.7	91.0	84.9	84.9 (2009)
Estonia	HI (2006)	14 146	6.0	11.7	91.2	78.7	66.8 (2004)
Hungary	HI (2007)	12 863	7.3	10.3	84.3	69.4	84.0 (1995) ^c
Indonesia	LMI	2 946	2.6	7.8	13.9	49.1	49.1 (2010)
Kyrgyzstan	LI	865	6.2	10.7	67.3	56.2	41.1 (2001)
Lithuania	UMI	11 100	5.2	12.6	82.9	73.0	71.3 (2011) ^d
Mexico	UMI	9 547	6.3	12.1	55.4	48.9	47.8 (1999)
Mongolia	LMI	2 207	5.4	8.0	41.4	55.1	55.1 (2010)
Poland	HI (2009)	12 292	7.5	11.9	83.7	72.6	72.3 (2009)
Romania	UMI	7 673	5.6	10.8	80.7	78.1	75.1 (2004)
Thailand	UMI	4 614	3.9	12.7	10.1	75.0	63.5 (2002)
The former Yugoslav Republic of Macedonia	UMI	4 470	7.1	12.9	91.7	63.8	66.5 (2009)
Piloting or exploring a DRG system							
Argentina	UMI	9 163	8.1	14.7	59.4	54.6	–
Bulgaria	UMI	6 333	6.9	9.8	64.6	54.5	–
Chile	UMI	11 901	8.0	16.3	14.2	48.2	–
China	UMI	4 358	5.1	12.1	64.7	53.6	–
Colombia	UMI	6 223	7.6	20.1	46.4	72.7	–
Costa Rica	UMI	7 419	10.9	29.0	86.2	68.1	–
Islamic Republic of Iran	UMI	5 655	5.6	10.5	55.3	40.1	–
Latvia	UMI	10 735	6.7	9.2	0.00	61.1	–
Malaysia	UMI	8 373	4.4	9.2	0.7	55.5	–
Montenegro	UMI	6 346	9.1	13.6	97.9	67.2	–
Republic of Moldova	LMI	1 630	11.7	13.1	88.1	45.8	–
Serbia	UMI	5 270	10.4	14.1	94.2	61.9	–
South Africa	UMI	7 255	8.9	11.9	2.5	44.1	–
Tunisia	UMI	3 832	6.2	10.7	48.4	54.3	–
Turkey	UMI	10 060	6.7	12.8	60.1	75.2	–
Uruguay	UMI	11 953	8.4	20.4	58.8	67.1	–
Viet Nam	LMI	1 212	6.8	7.8	36.0	37.8	–

DRG, diagnosis-related groups; GDP, gross domestic product; GGHE, general government expenditure on health; HI, high-income; LI=low-income; LMI, lower-middle-income; THE, total health expenditure; UMI, upper-middle-income; US\$, United States dollar; WHO, World Health Organization.

^a World Health Organization (WHO) national health accounts estimates.

^b World Bank income classification. Figures in parentheses indicate the year when the country entered the classification shown.

^c Earliest available data.

^d Latest available data (introduction in 2012).

Source: Latest data available: WHO 2012 (data for 2010); World Bank 2013 (data for 2011).